Standard 25 ICS Transmitted Light Microscope

Operating Manual

Knowledge of this manual is required for the operation of the instrument. Would you therefore please make yourself familiar with the contents of this manual and pay special attention to hints concerning the safe operation of the instrument.

The specifications are subject to change; the manual is not covered by an update service.

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Notes on instrument safety

The Standard 25 ICS microscope was designed, produced and tested in compliance with DIN 61010-1 (IEC 1010-1), Safety requirements for electrical measuring, control and laboratory instruments, and meets the requirements of appendix I of directive 73/23/EC and the relevant CSA and UL directives. The microscope meets the requirements of the EC directive 89/336/EC and the EMC legislation of November 9, 1992. This operation manual includes information and warnings which must be observed by the user.

The following warning and information symbols are used in this manual:

NOTE
This symbol (hand) is a warning which you must observe under all circumstances.

CAUTION
This symbol (warning triangle) is a warning which indicates a hazard to the operation of the instrument.

CAUTION
Disconnect the instrument from the line!

The Standard 25 ICS microscope, including its original accessories, may only be used for the microscope techniques described in this manual.

Particular attention must be paid to the following warning notes:

The Standard 25 ICS microscope is categorized as Protection Class I and has been allocated the protection degree IP 20. The power plug must be inserted in a properly installed socket featuring a grounding contact. The grounding effect must not be made ineffective by an extension cable which does not have a protective ground wire.

Before switching on the instrument, check whether it is suitable for the line voltage present. Admissible voltage: 100...240 V AC, 50...60 Hz (depending on the model).

Always disconnect the instrument from the line before opening the instrument, before changing the voltage and before changing the fuses.

When changing the instrument fuses, make sure to use only those of the rated power required and the type indicated. The use of makeshift fuses and the short-circuiting of the fuse holders are not permitted.

If it is established that the protection measures are no longer effective, the instrument must be switched off and safeguarded against inadvertent operation.

Dust and dirt can impair the performance of the instrument. Therefore, protect the instrument against these influences as far as possible. If the microscope will not be used for longer periods of time, it must be protected using the dust cover.

The instrument must be operated by trained personnel only who must be aware of the possible danger involved with microscopy and the relevant application.

The Standard 25 ICS microscope is an optical precision instrument which can be impaired in its performance or damaged when handled improperly.

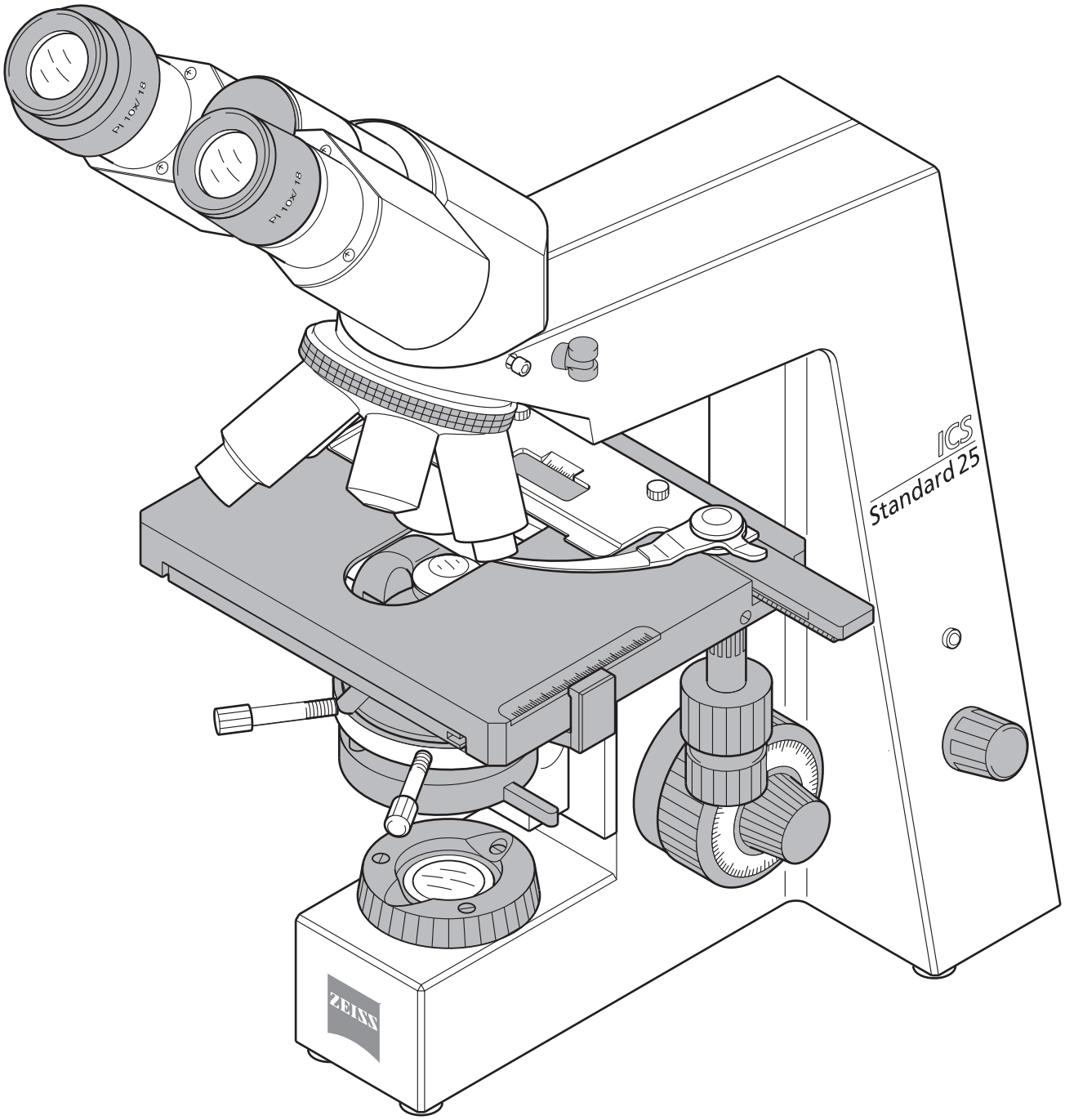
Notes on warranty:

The manufacturer guarantees that the instrument has no material and production defects when delivered. You must inform us of any defects immediately and we must do anything to minimize the damage. If the manufacturer is informed of such a defect, he is obliged to remove it; it is his decision whether he does this by repairing the instrument or by delivering an instrument free of any defect. No guarantee is provided for defects caused by natural wear (wearing parts in particular).

The instrument manufacturer is not liable for damage caused by faulty operation, negligence or any other meddling with the instrument, or the use of accessories from other manufacturers. This forfeits all the claims against warranty.

With the exception of the work specified in this manual, no maintenance or repair of the Standard 25 ICS may be performed. Repairs may only be performed by Zeiss service staff or specially authorized personnel. Should any defect occur with the instrument, please get in touch with your local Zeiss agency first.

Overall view of the Standard 25 ICS microscope with polarization equipment



DESCRIPTION

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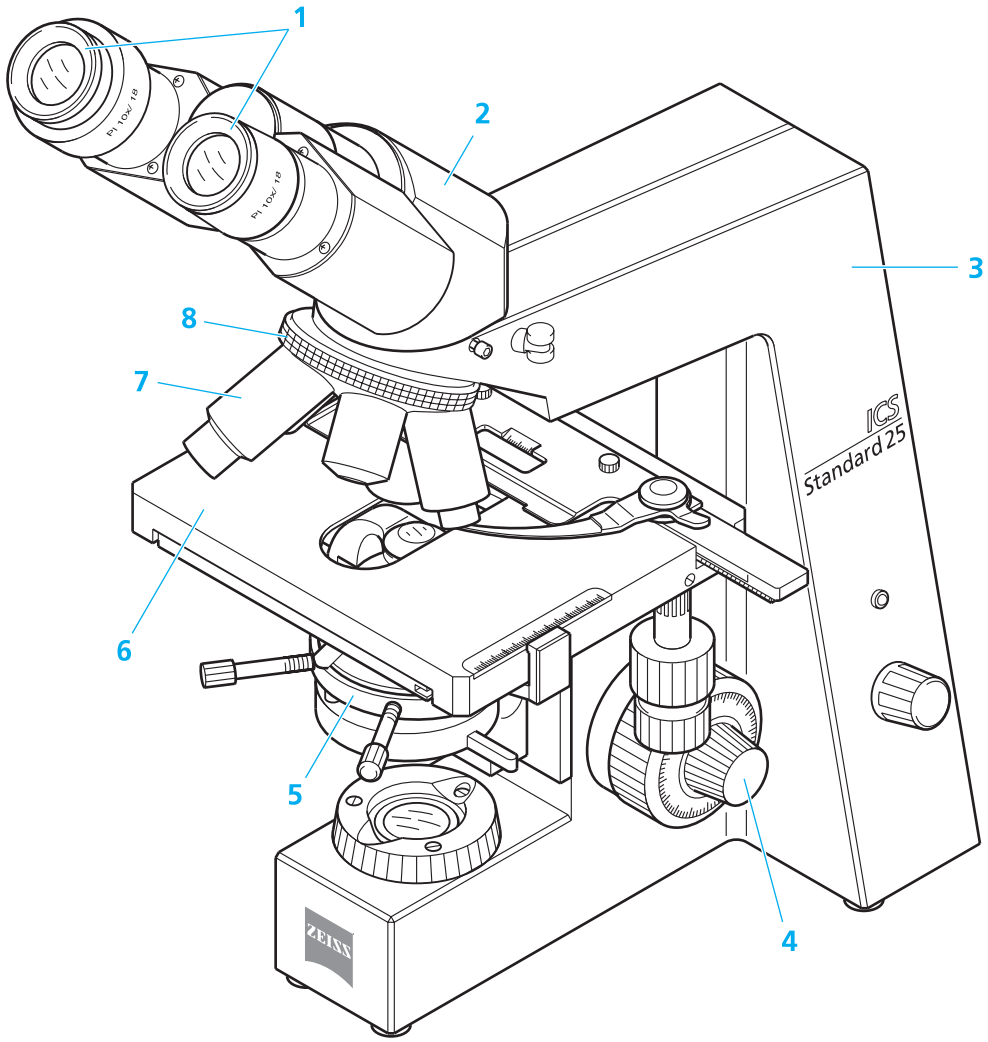


Fig. 1-1 Microscope modules

1 Eyepieces
2 Binocular tube
3 Stand
4 Coaxial coarse and fine drive
5 Condenser carrier with condenser
6 Mechanical stage with specimen holder
7 Objective
8 Objective nosepiece

1 DESCRIPTION

1.1 Name and intended application

Manufacturer's name: Standard 25 ICS microscope

The Standard 25 ICS microscope is a universal microscope for the visualization of fine structures and forms in biology and medicine. These are typical application fields of the Standard 25 ICS:

- laboratory microscopy
- doctor's offices
- training (schools and universities).

1.2 Instrument description and main features

Thanks to its pyramid design, the Standard 25 ICS is a compact transmitted-light microscope. In addition to high-resolution ICS objectives and the major brightfield, darkfield, phase contrast and polarization contrast techniques, an optional camera port for photo and video documentation is also available to the user.

Major instrument features:

- Sturdy and convenient stand in the pyramid design.
- User-friendly coaxial coarse and fine drive
- Mechanical stage 75x30 R with ceramic-coated stage surface and specimen holder
- Space-saving and continuously adjustable, integrated illuminator with long-life 6V 20W halogen lamp.
- Swing-in 0.9 Z condenser for brightfield, and Ph condenser II Z 0.9 for brightfield and phase contrast Ph1, 2 and 3.
- Ball-bearing, 5-position nosepiece with W 0.8" thread.
- ICS objectives in the price/performance categories CP-Achromat, A-Plan and Achroplan.
- Binocular tube 45°/20 ICS with a viewing height of approx. 440 mm, and binocular phototube 35°/20 with sliding prism 100 obs /100 doc.
- 10x eyepieces for the field numbers 20 or 18, suitable for spectacle wearers, fixed and adjustable.

1.3 Microscope configurations and modules

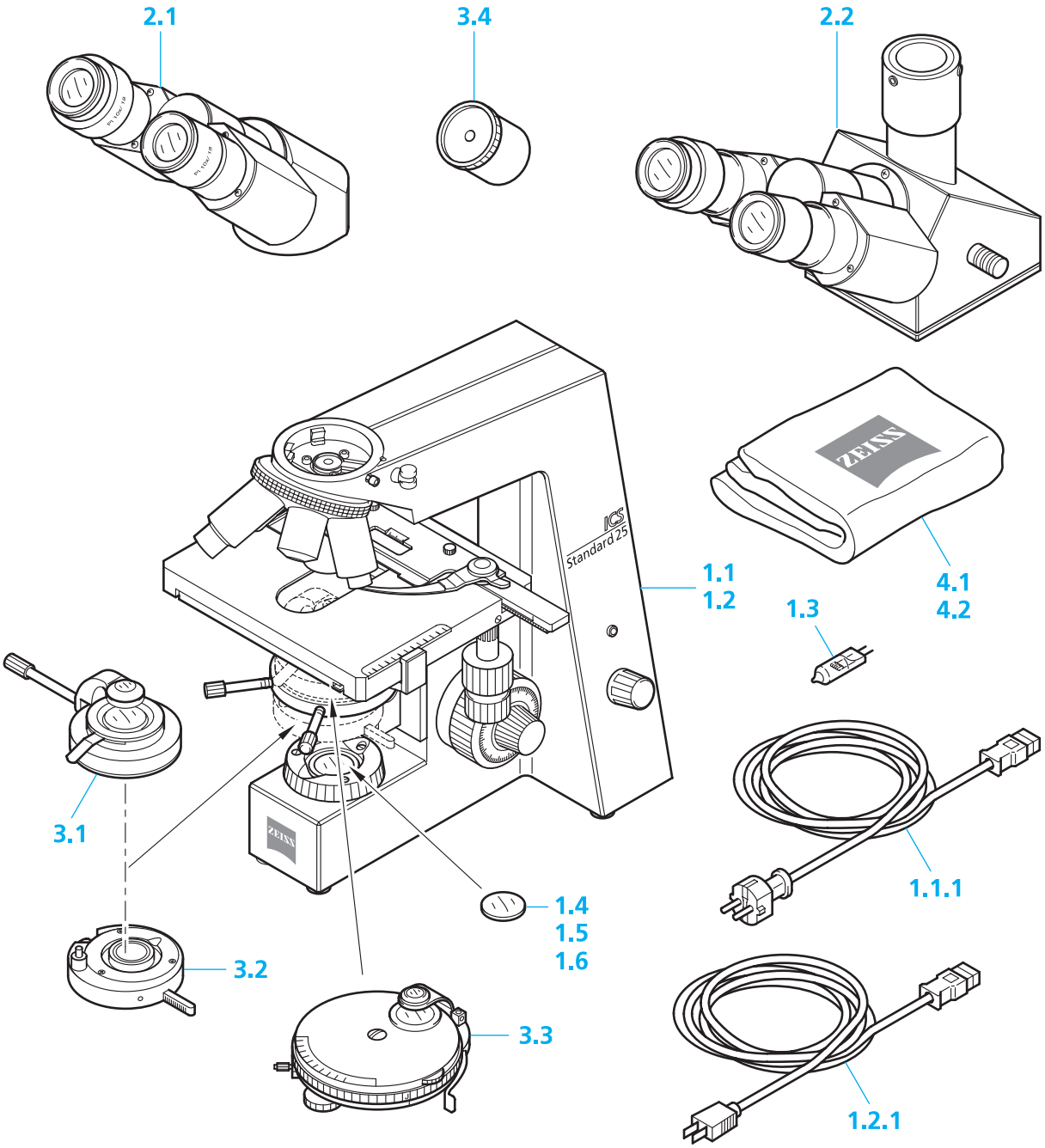


Fig. 1-2 **Standard 25 ICS microscope configurations with polarization equipment**

		Cat. No.
	Configurations	
	Standard 25 ICS binocular microscope for transmitted-light brightfield and phase contrast using CP Achromat objectives 10x, 40x Ph2 and 100x	490841 9804 490841 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield using objectives "A-Plan" 10x, 40x and 100x	490845 9804 490845 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield and phase contrast using objectives "A-Plan" 10x, 40x Ph 2 and 100x	490846 9804 490846 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield and phase contrast using objectives "A-Plan" 10x, 20x Ph 2 and 40x Ph 2	490847 9804 490847 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield and phase contrast using objectives "A-Plan" 10x Ph 1, 40x Ph 2 and 100x Ph 3	490848 9804 490848 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield using objectives "A-Plan" 10x, 40x and 100x and phototube	490865 9804 490865 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield and phase contrast using objectives "A-Plan" 10x, 40x Ph 2 and 100x and phototube	490866 9804 490866 9904
	"Standard 25 ICS" binocular microscope for transmitted-light brightfield and phase contrast using objectives "A-Plan" 10x Ph 1, 40x Ph 2 and 100x Ph 3 and phototube	490868 9804 490868 9904
	Modules	
1.1	"Standard 25 ICS" microscope stand with mechanical stage 75x30 R, 5-position nosepiece W 0.8, including integrated illuminator stabilized power supply 220 ... 240 V/50 ... 60 Hz / 45 VA	 450815 9902
1.1.1	Line cable with European plug	
1.2	"Standard 25 ICS" microscope stand with mechanical stage 75x30 R, 5-position nosepiece W 0,8, including integrated illuminator stabilized power supply 100 ... 127 V / 50 ... 60 Hz / 45 VA	 450816 9902
1.2.1	Line cable with American flat plug	
1.3	Long-life 6 V 20 W halogen lamp (spare lamp)	380079 9690
1.4	Conversion filter CB 3; d=32x2 mm	467852
1.5	Conversion filter CB 12, d=32x2 mm	467850 9901
1.6	Interference wide-band filter, green, d=32x4 mm	467803
2.1	Binocular tube 45°/20 ICS	452928
2.2	Binocular phototube 35°/20 ICS (100% obs / 50% obs : 50% doc)	452929
3.1	Swing-in 0.9 Z condenser	445211
3.2	Phase stop carrier Ph 2 for 445211	470864
3.3	Phase contrast condenser II Z 0.9 Ph 1, 2, 3 and D (0.6/0.9)	445210
not shown	Dry darkfield condenser 0.7 - 0.85 and Z condenser holder	465506, 445215
not shown	Dry darkfield condenser 0.8 - 0.95 and Z condenser holder	465505, 445215
not shown	Ultra-condenser 1.2 - 1.4 and Z condenser holder	465500, 445215
3.4	Diopter d=30 mm	444020
4.1	Dust cover K	459300
4.2	Dust cover G (if binocular phototube is used)	459306

All the above microscope configurations with catalogue numbers ending in 9804 feature the line voltage 230 V, and those ending in 9904 have a line voltage of 115 V.

1.4 Objectives

The objectives are the optical centerpiece of the microscope. The following is an example of how objectives can be labelled:

CP ACHROMAT 10x/0.25 ∞/-

where

10x	=	objective magnification, with a defined color ring on the objective being allocated to each magnification step (Zeiss color code)
0.25	=	numerical aperture
∞	=	infinite tube length
-	:	can be used with cover slip thickness D = 0 or 0.17
or		
0.17	=	can be used with cover slip thickness D = 0.17
and		
Oil	=	oil immersion objective
Ph 2	=	phase contrast objective with a green color ring and phase stop Ph 2

The objective magnification multiplied by the eyepiece magnification (minimum 10x) results in the visual overall magnification, e.g. 10 x 10 = 100x.

The numerical aperture x 1000, e.g. 0.25x1000 = 250x, is the highest useful magnification, i.e. no further details are resolved above that limit.

The objective labeling ∞ indicates that these objectives may only be used with microscopes featuring an infinite tube length and not with instruments the objectives of which are marked with "160" as their mechanical tube length.

The exact observance of the cover slip thickness of 0.17 mm is all the more necessary the higher the numeric aperture of the objective. Therefore, so-called "Corr" objectives can be set for different cover slip thicknesses via a correction ring. For this, a specimen area is searched, and the position of the correction ring where optimum focus and image contrast are obtained is determined (refocusing is always required).

Immersion objectives are always insensitive to differences in cover slip thickness.

When immersion objectives are used, the air between the cover slip and the objective is replaced with a liquid, which is immersion oil in most cases. The plastic oiler containing 20 ml of 581 N immersion oil is particularly suitable for this purpose.

Due to their short working distance, objectives 25x and higher feature resilient mounts (specimen protection). To prevent oil contamination of the specimen when the nosepiece is turned, the resilient mounts of the immersion objectives can be locked in their lifted position by turning them to the right (do not forget to unlock them again!).

The following objectives are available for the Standard 25 ICS microscope:

Microscopy Technique	Objective	Magnification/Num. Aperture	Free working distance in mm	Cover slip thickness D in mm	Cat.No.
	CP-Achromat				
Transm.-light brightfield	CP-Achromat	5x/0.12	11.2	-	440920
	CP-Achromat	10x/0.25	5.1	-	440930
	CP-Achromat	40x/0.65	0.3	0.17	440950
	CP-Achromat	100x/1.25 Oil	0.07	0.17	440980
Phase contrast	CP-Achromat	10x/0.25 Ph 1	5.1	-	440931
	CP-Achromat	40x/0.65 Ph 2	0.3	0.17	440951
	CP-Achromat	100x/1.25 Oil Ph 2	0.07	0.17	000000 1007 159
	CP-Achromat	100x/1.25 Oil Ph 3	0.07	0.17	440981
	A-Plan				
Transm-light brightfield	A-Plan	5x/0.12	9.9	-	441020
	A-Plan	10x/0.25	4.4	-	441030
	A-Plan	20x/0.45	0.53	0.17	441040
	A-Plan	40x/0.65	0.43	0.17	441050
	A-Plan	100x/1.25 Oil	0.22	0.17	441080
Phase contrast	A-Plan	10x/0.25 Ph 1	4.4	-	441031
	A-Plan	20x/0.45 Ph 2	0.53	0.17	441041
	A-Plan	40x/0.65 Ph 2	0.43	0.17	441051
	A-Plan	100x/1.25 Oil Ph 3	0.22	0.17	441081
	Achrostigmat				
Transm.-light brightfield	Achrostigmat	20x/0.45	1.6	0.17	440140
	Achrostigmat	40x/0.85 Oil	0.28	0.17	440250
Phase contrast	Achrostigmat	20x/0.45 Ph 2	1.6	0.17	440141
	LD-Achrostigmat	20x/0.30 Ph 1	1.0...2.2	0...2.0	440147
	LD-Achrostigmat	32x/0.40 Ph 1	1.5...2.2	0.5...1.5	440149
	Achroplan				
Transm.-light brightfield	Achroplan	4x/0.10	11.1	-	440020
	Achroplan	10x/0.25	4.8	-	440030
	Achroplan	20x/0.45	2.07	0.17	440040
	Achroplan	40x/0.65	0.59	0.17	440050
	Achroplan	50x/0.90 Oil	0.29	0.17	440057
	Achroplan	63x/0.80	0.29	0.17	440060
	Achroplan	63x/0.95	0.15	0 (no cover slip)	440068
	Achroplan	100x/1.25 Oil	0.19	0.17	440080
	Achroplan	100x/1.25 Oil Iris	0.19	0.17	440086
Phase contrast	Achroplan	10x/0.25 Ph 1	4.8	-	440031
	Achroplan	20x/0.45 Ph 2	2.07	0.17	440041
	Achroplan	40x/0.65 Ph 2	0.59	0.17	440051
	Achroplan	100x/1.25 Oil Ph 3	0.19	0.17	440081
	Plan-Neofluar				
Transm.-light brightfield	Plan-Neofluar	2.5x/0.075	9.3	-	440310

1.5 Eyepieces

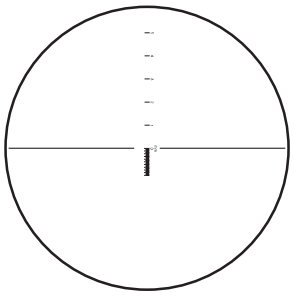
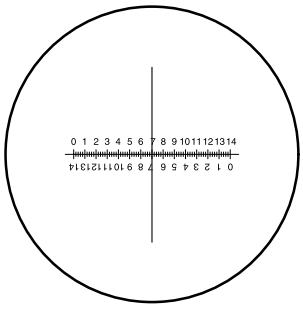
The following eyepieces are offered for the Standard 25 ICS:

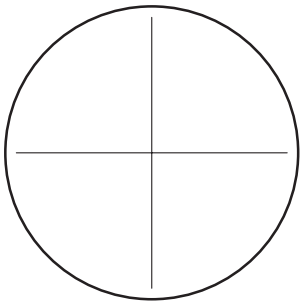
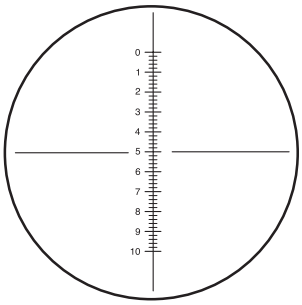
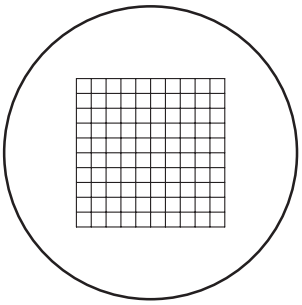
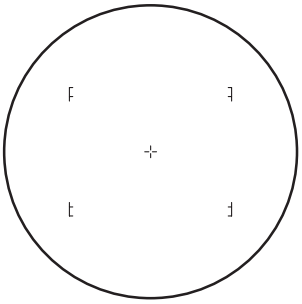
Eyepiece	Image Angle	Cat. No.
Eyepiece PL 10x/18 Br.	39°	444131 9901
Eyepiece PL 10x/18 Br. foc.	39°	444132 9901
Eyepiece E-PL 10x/20 Br.	43°	444231 9901
Eyepiece E-PL 10x/20 Br. foc.	43°	444232 9902
Eyepiece PL 16x/16 Br.	54°	444053
Eyepiece PL 16x/16 Br. foc.	54°	444054

If required, eyecups for the eyepieces can be ordered under the Cat. No. 444801.

1.6 Stage micrometers and eyepiece reticles

Measuring and counting using the microscope requires stage micrometers and eyepiece reticles, a small selection of which is listed below:

Illustration	Description, Technical Data	Cat. No.
	**Stage micrometer, positive 5 + 100/100 y** D = 0.17 mm gradation on the + y-axis: 5 mm in 5 intervals; gradation on the - y-axis: 1 mm in 100/100 mm = 10 µm, accuracy ±1µm	474026
	**Crossline micrometer disk 14:140 / d =26 mm** gradation length=14 mm increments = 0.1mm gradation tolerance ≤ 0.001 mm	454060

	**Crossline disk / d = 26 mm**	474064
	**Crossline micrometer disk 10:100 / d =26 mm** gradation length=10 mm increments = 0.1mm gradation tolerance ≤ 0.001 mm	474066 9901
	**Net micrometer 12.5x12.5/5;10 / d = 26 mm** area 12.5x12.5 mm, divided in fields of 5x5 or 10x10.	474068
	**Photo reticle MC 2.5x / d = 26 mm** for 35 mm photography with an additional magnification of 2.5x or for large-format photography with a 10x additional magnification.	454075

If an eyepiece reticle is used, the binocular tube or the phototube must be equipped with two foc. eyepieces containing an adjustable eyelens, into one of which the eyepiece reticle is mounted.

1.7 Technical Data

(1) Dimensions (width x depth x height)

Stand with binocular tube ..... approx. 200 x 350 x 450 mm
Stand with phototube ..... approx. 200 x 375 x 460 mm
Overall height including T2 adapter and CONTAX 167 MT camera housing ..... approx. 570 mm

(2) Weight

Standard 25 ICS with binocular tube ..... approx. 6.7 kg

(3) Ambient conditions

Storage and transport (in packaging):

Permissible ambient temperature ..... -40 to + 70° C
Permissible relative humidity (without condensation) .....max. 100 %

Operation:

Permissible ambient temperature ..... +10 to + 35° C
Permissible relative humidity (without condensation) .....max. 85 %
Altitude ..... max. 2000 m
Atmospheric pressure ..... 800 hPa to 1060 hPa

(4) Operating data

Operation ..... closed rooms
Protection class I
Enclosure protection .....IP 20
Electrical safety .....in compliance with DIN EN 61010 (IEC 1010-1) including CSA and UL directives
Pollution degree 2
Overvoltage category II
Radio interference suppression ..... in accordance with EN 55011, Class B
Line voltage ..... 100 to 127 V AC (±10%) or 220 to 240 V AC (±10%)
Line frequency ..... 50 to 60 Hz
Label of voltage range ..... see instrument rear
Power consumption .....max. 45 VA
Output voltage .....stabilized, adjustable from 1.5 to 6 V

(5) Fuses according IEC 127:

for 230 V ..... T 0.2 A; 250 V; 5 x 20 mm
for 115 V ..... T 0.4 A; 250 V; 5 x 20 mm

(6) Light source

Halogen lamp ..... HAL 6 V 20 W
Adjustment of the light source ..... continuous, ≤1.5 to 6 V DC
Color temperature at 6 V ..... 2800 K [1]
Light flux ..... 280 lm
Average life ..... 1000 h
Luminous area ..... 2.0 x 2.0 mm

(7) Opto-mechanical data

Stand with stage focusing ..... with coarse drive (4mm/rot) [2]
..... and fine drive (0.4mm /rot)
..... Overall lift 15 mm
Objective change ..... manually via 5x nosepiece
Objectives ..... ICS line of objectives with W 0.8" thread
Eyepieces ..... 30 mm plug-in diameter
with field number 18 ..... Pl 10x/18 Br. and Pl 10x/18 Br. foc. or
with field number 20 ..... E-Pl 10x/20 Br. and E-Pl 10x/20 Br. foc.
Specimen stage ..... mechanical stage 75x30 R with ceramic surface
Dimensions (width x depth) ..... 160 x 140 mm
Travel range (width x depth) ..... 75 x 30 mm
Specimen holder ..... with spring clip to the right or for one-handed operation
Swing-in condenser 0.9 Z ..... for $M_{Obj.} < 10x$ swing out condenser front lens 0.9
..... for $M_{Obj.} \geq 10x$ swing in condenser front lens 0.9
Binocular tube 45°/20 ICS
maximum field number 20
interpupillary distance ..... can be set between 55 and 75 mm
Viewing angle ..... 45°
Viewing height ..... approx. 440 mm
Visual port ..... tube factor 1x

---

[1] For photography using artificial light color reversal film for 3200 K, the conversion filter CB 3 (467852) produces the correct color temperature in the light path.

[2] The scale on the coarse drive (0 to 400) permits the orienting measurement of the object thickness: 1 increment corresponds to approx. 5 µm

Binocular phototube 35°/20

maximum field number	20
interpupillary distance	can be set between 55 and 75 mm
viewing angle	35°
viewing height	approx. 430 mm
visual port	tube factor 1x
camera/video port	tube factor 1x
camera/video port	interface 60 mm
switched via sliding prism	100% obs / 50% obs : 50% doc

START-UP

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2 START-UP

The Standard 25 ICS microscope, including accessories, is delivered in standard packaging. We would recommend you to keep the packaging material so that the instrument can be stored for a longer period of time or returned to the manufacturer.

2.1 Unpacking the instrument

- Remove the microscope from the transport case and place it on the worktable.

2.2 Attach binocular tube 45°/20 ICS or binocular phototube 35°/20 ICS.

- Loosen hexagonal screw (2-1/**5**) using the SW3 ball-headed screwdriver (2-1/**4**). Remove dust covers (2-1/**1**) from tube underside and the dovetail mount on the stand.
- Hold the binocular tube (2-1/**3**) or the binocular phototube 2-1/**2**) in a slightly inclined position and attach it to the stand mount via the dovetail. Turn the binocular tube into the required observation position and tighten the hexagonal screw using the screwdriver.

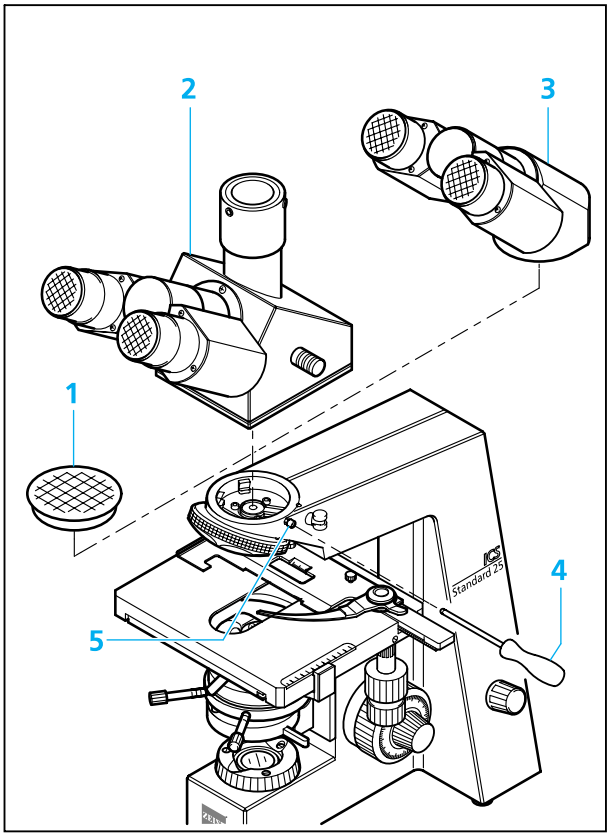

Fig. 2-1 Attachment of binocular tubes

2.3 Screwing-in of objectives

- Remove dust caps (2-2/**2**) according to the number of objectives and screw objectives (2-2/**3**) in nosepiece (2-2/**1**) clockwise one by one, starting with the lowest magnification.

The dust caps should remain on those nosepiece eyes which are not required.

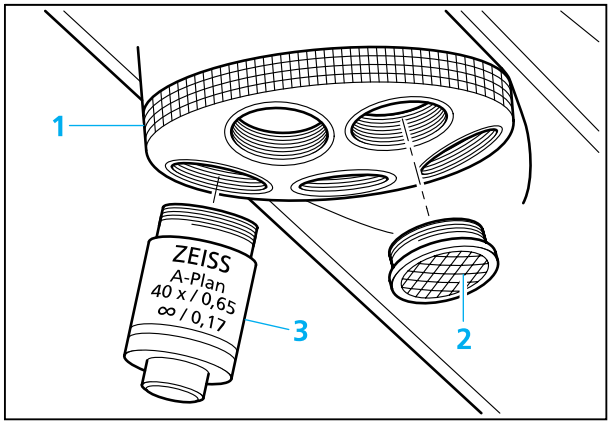

Fig. 2-2 Screwing-in of objectives

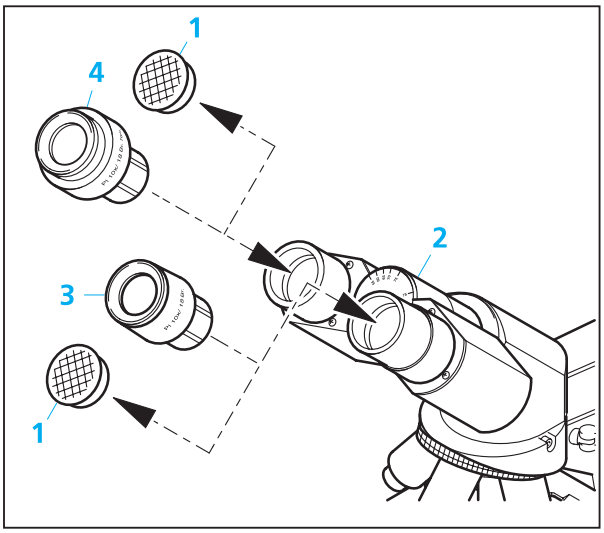

Fig. 2-3 Insertion of eyepieces

2.4 Insertion of eyepieces

- Remove both protection caps (2-3/**1**) from the binocular tube (2-3/**2**).
- Insert the fixed eyepiece, e.g. Pl 10x/18 Br. (2-3/**3**) in the right tube and the focusing eyepiece Pl 10x/18 Br. foc. (2-3/**4**) in the left tube.

The focusing eyepiece is used to compensate for ametropia of the eyes.

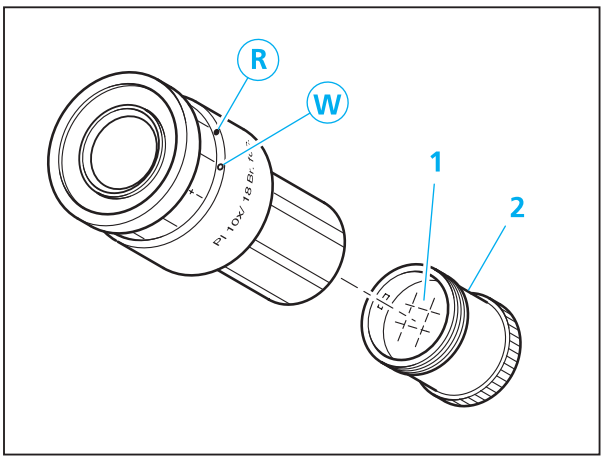

Fig. 2-4 Insertion of eyepiece reticle

2.4.1 Insertion of eyepiece reticle

The eyepieces Pl 10x/18 Br. foc. and E-Pl 10x/20 Br. foc. are intended for use with eyepiece reticles (see overview under 1.6).

The slight image shift caused by the additional path through the glass is taken into account on the diopter scale by the fact that the zero point position is indicated not by the white dot **W** (2-4/**W**) but by the red dot **R** (2-4/**R**).

The eyepiece reticles (2-4/**1**) have been adhered to screw-in mounts (2-4/**2**) to allow easy replacement.

- To replace a reticle, unscrew the screw-on mount or the part containing the eyepiece reticle and replace it with the required one.

If eyepiece reticles are inserted into the unscrewed mount by the customer, attention must be paid to the labelling being visible the right way up after insertion.

2.4.2 Compensation of ametropia when eyepiece reticles are used

The correct use of an eyepiece reticle requires two focusing eyepieces, e.g. PI 10x/18 Br. foc., to enable compensation of ametropia.

- Use the eyelens of the focusing eyepiece to focus on the line figure of the eyepiece reticle; focus on the edge of the field of view if no eyepiece reticle is used.
- Focus on the microscope image of a specimen via the focusing drive by looking through the eyepiece with reticle.
- When the image and the eypiece reticle are in focus in the above eyepiece, focus the image for the second eye via the focusing eyelens of the second eyepiece.

The position of the focusing drive on the stand must not be changed.

2.5 Setting of interpupillary distance and viewing height

- The eyepiece distance is matched to the individual interpupillary distance by swinging the eyepiece tubes symmetrically towards one another.
- The viewing height can be increased (2-5/**A**) or reduced (2-5/**B**) by turning the entire binocular tube through 180°.

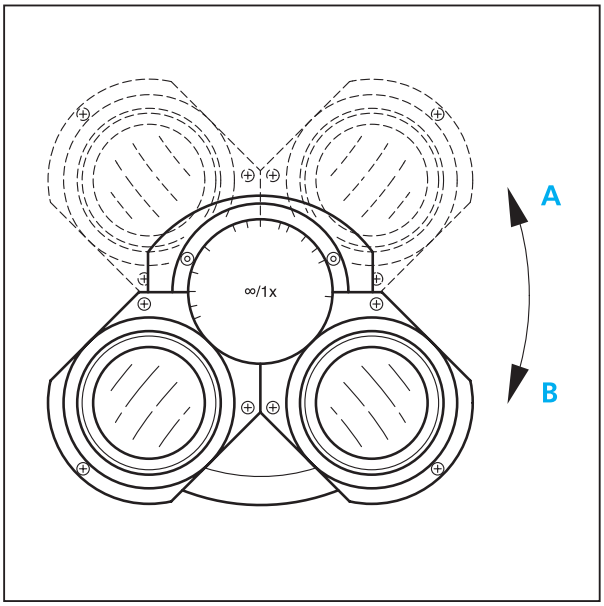

Fig. 2-5 **Setting the interpupillary distance and viewing height of the binocular tube**

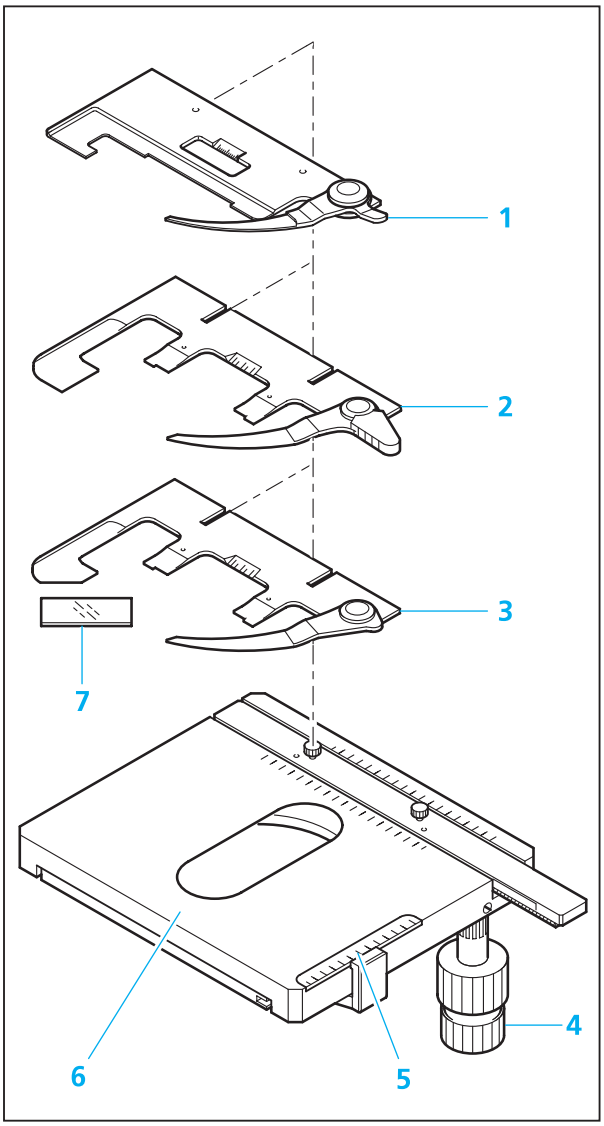

Fig.2-6 **Attachment of specimen holder to mechanical stage 75x30 R**

2.6 Attachment of specimen holder to mechanical stage 75x30 R

The Standard 25 ICS features the mechanical stage 75x30 R with ceramic coating (2-6/**6**).

The specimen is precisely moved in x and y using the user-friendly coaxial drive (2-6/**4**).

The x/y gradation on the stage surface (2-6/**5**) with the two vernier scales helps to relocate certain specimen spots.

The readily mounted specimen holder with spring clip R (453536) (2-6/**1**) is part of the standard configuration.

As an alternative, it is also possible to use

- the specimen holder with sprig clip R (473448) (2-6/**2**)

  or

- the specimen holder for one-handed operation (453548) (2-6/**3**).

- Here, the microscope slide (2-6/**7**) is inserted into the specimen holder along the guiding edge, the spring clip is swung out and will automatically clamp the microscope slide in its stop position.
- The specimen holders can be easily exchanged in the x-direction using the two fixation screws on the guiding rail. Loosen the two fixation screws, pull out specimen holder to the front and insert new specimen holder until it engages in the guiding slots. Tighten the two fixation screws again.

2.7 Attachment of condensers

2.7.1 Attach condenser 0.9 Z

- Unscrew both centering screws (2-7/**3**) on the condenser carrier (2-7/**2**) until the condenser 0.9 Z (2-7/**9**) can be easily inserted in the condenser carrier.
- Insert condenser 0.9 Z (2-7/**9**) in the condenser carrier (2-7/**2**) in such a way that, firstly, the dovetail of the condenser is pressed against spring pin (2-7/**1**) in the condenser carrier and, secondly, the aperture diaphragm lever (2-7/**8**) can be conveniently operated from the front.
- Tighten both centering screws (2-7/**3**) on the condenser carrier (2-7/**2**) until they engage in the dovetail and keep the condenser (2-7/**9**) in position.

The Ph 2 phase stop carrier (2-7/**4**) must be mounted as follows:

- Screw locking screw (2-7/**6**) into the left drilled hole (2-7/**7**) on the underside of the condenser carrier. The locking screw keeps the Ph 2 phase stop carrier in its functional position.
- Then screw Ph 2 phase stop carrier (2-7/**4**) into the drilled hole (2-7/**5**) on the underside of the condenser carrier.

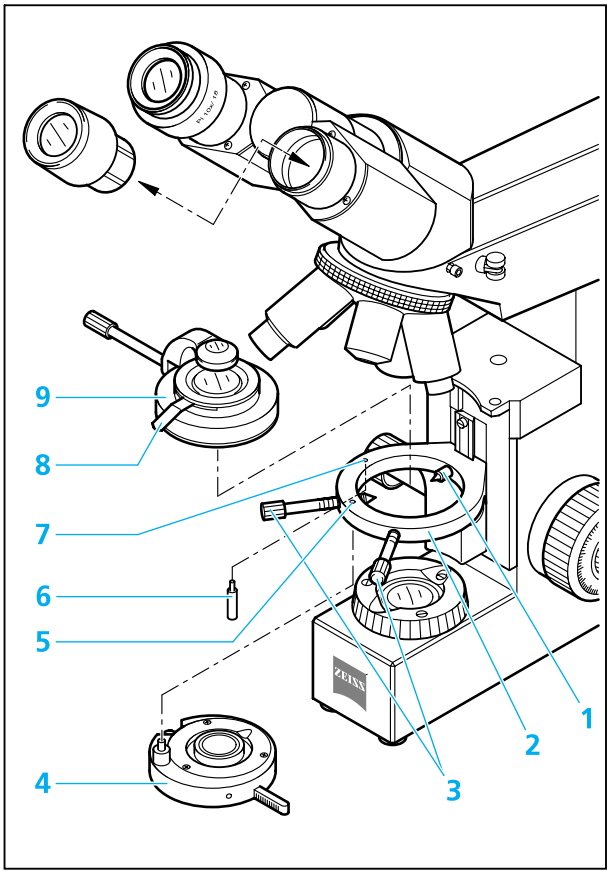

Fig. 2-7 Attachment of condenser 0.9 Z

2.7.2 Attach phase contrast condenser II Z 0,9 Ph 1, 2, 3 and D (0.6/0.9)

With the exception of the orientation in the condenser carrier (2-7/**2**), the phase contrast condenser II Z 0.9 is inserted in the Standard 25 ICS in the same way as the above condenser 0.9 Z.

- Insert condenser II Z 0.9 (2-8/**1**) in the condenser carrier (2-7/**2**) in such a way that knob (2-8/**2**) points to the observer.

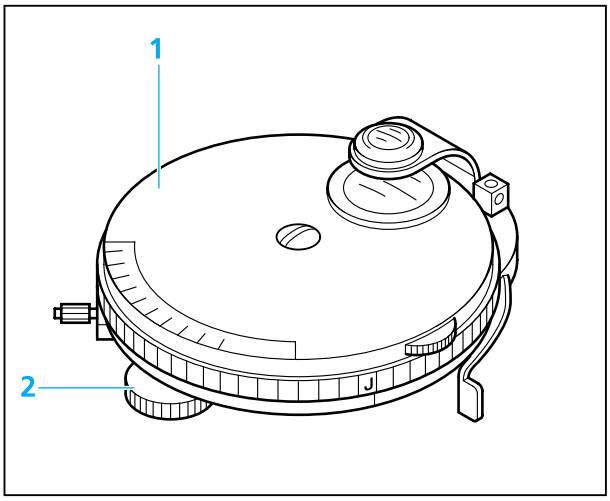

Fig. 2-8 Attachment of phase contrast condenser II Z 0.9 Ph 1, 2, 3 and D (0.6/0.9)

2.8 Connecting the instrument to the line

Check whether the voltage indicated at the rear of the instrument complies with the line voltage!
Do not connect the instrument to the line if the instrument voltage and the line voltage are not identical and make sure to inform the nearest CZ agency or CZ service agency.

- Connect the line cable with connector (2-9/**4**) to the instrument socket (2-9/**3**) and connect the earth-contact plug (2-9/**5**) to the line.
- Switch on the instrument via the on/off switch (2-9/**2**) on the instrument rear.
- The green LED (2-9/**1**) lights up to indicate that the instrument is ready for operation (on/off switch in "I" position), and the integrated halogen lamp must also be on.

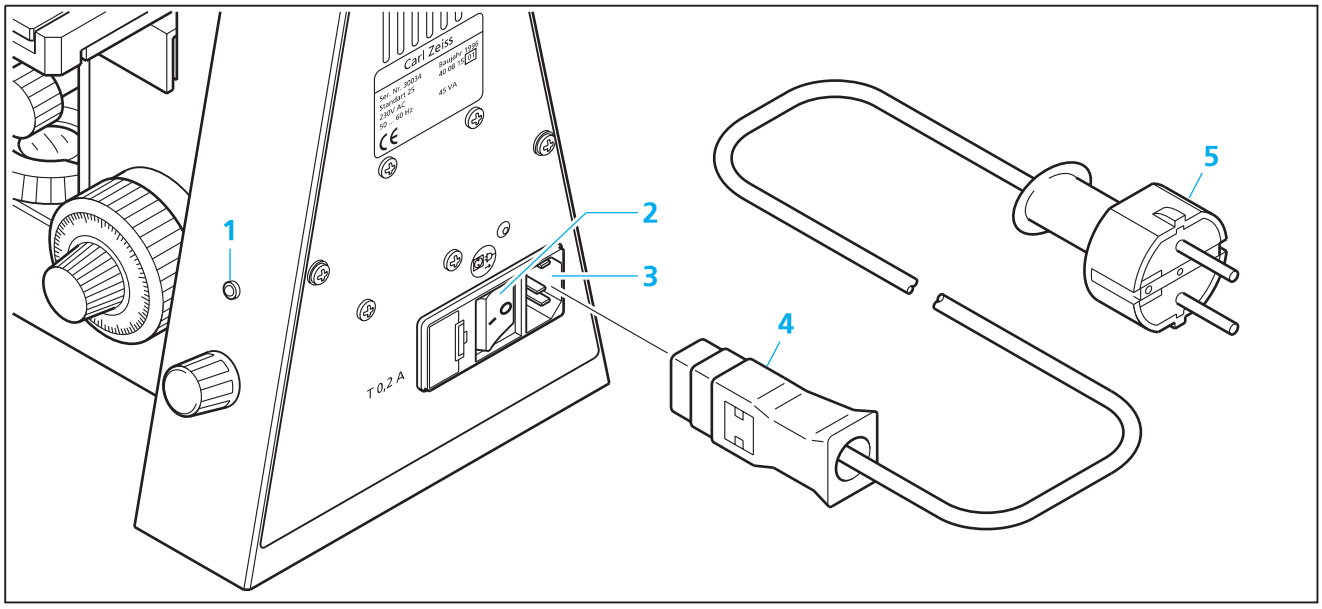

Fig. 2-9 Connecting the instrument to the line

OPERATION

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3 OPERATION

3.1 Switch on the instrument

- Switch on the instrument via the on/off switch (3-1/**3**) on the instrument rear. The green LED (3-1/**2**) must light up.
- Set the required brightness via the "Brightness" control (3-1/**1**).

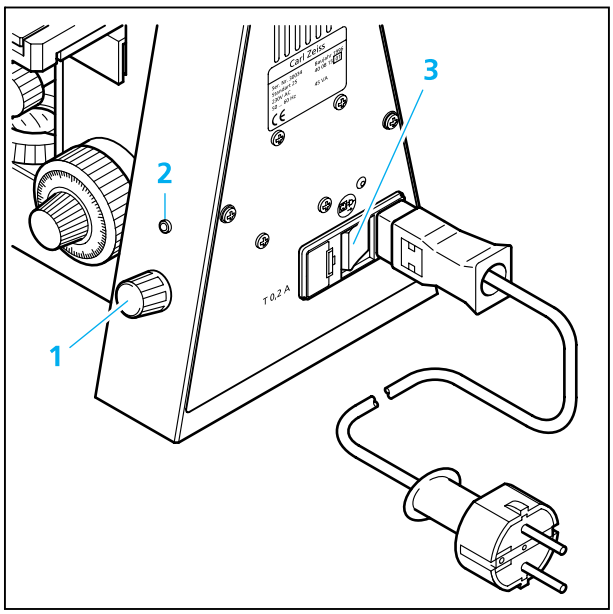


Fig. 3-1 Switch on the instrument

Depending on the application, place one or several of the following dia. 32 filters (3-2/**1**) on the dust-protection glass of the luminous-field diaphragm:

- interference wide-band filter, green, 32x4, for contrast enhancement in b/w photography of stained sections and for phase contrast;
- CB 3 conversion filter, 32x2, to generate the correct color temperature of 3200 K when artificial light color reversal film is used.
- CB 3, 32x2, and CB 12, 32x2, conversion filters for use with daylight color film

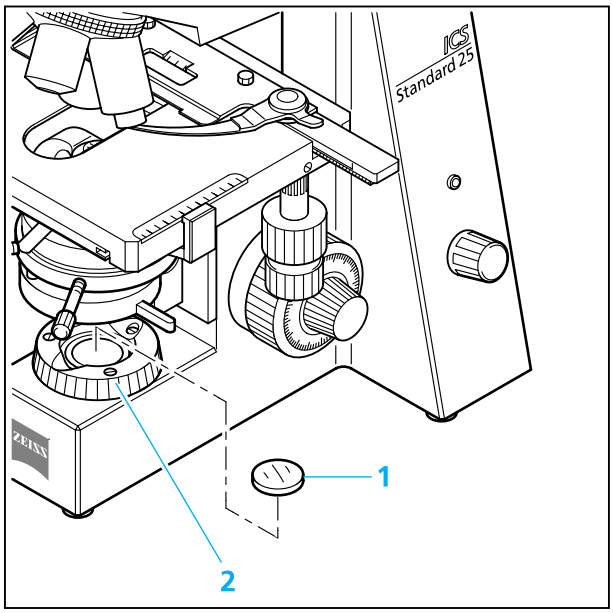


Fig. 3-2 Insertion of filters

The Standard 25 ICS is supplied with factory-aligned illumination. The illumination need not be adjusted even when the lamp is exchanged by the customers themselves.

3.2 Setting of transmitted-light brightfield for KÖHLER illumination

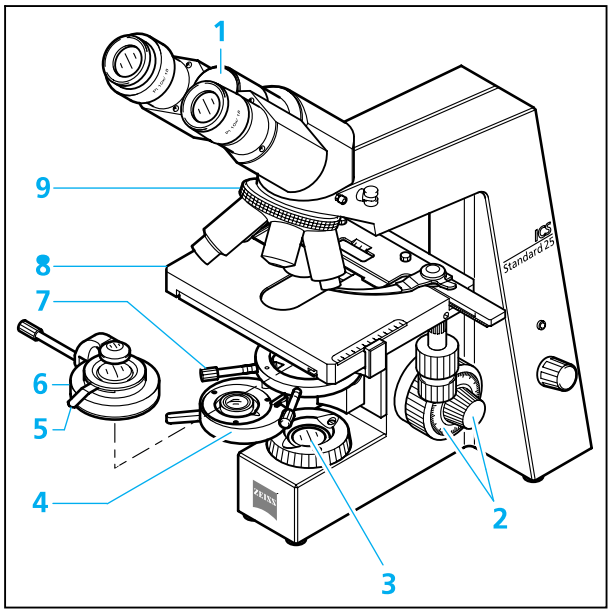


Fig. 3-3 Setting of brightfield

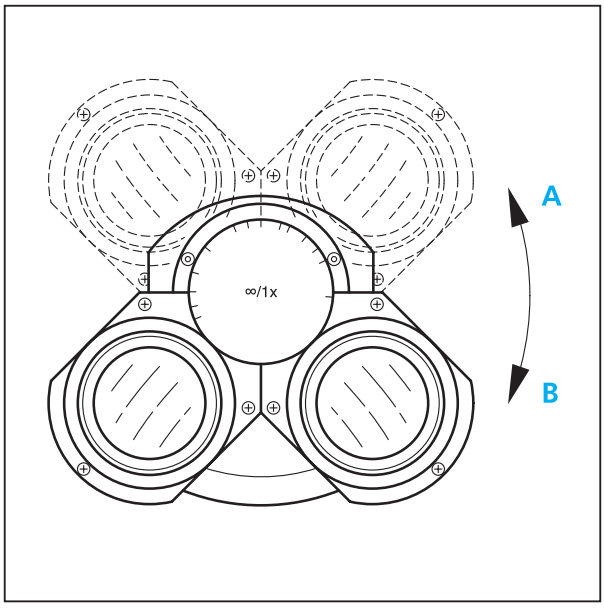


Fig. 3-4 Setting of interpupillary distance of the binocular tube

As described in chapter 2, the microscope is ready for operation and switched on according to section 3.1.

- If the Ph 2 phase stop carrier (3-3/**4**) is available on condenser 0.9 Z (3-3/**6**), it should be swung out of the optical beam path for microscopy in transmitted-light brightfield.

Furthermore, the following basic settings of the microscope are required:

- First, place a high-contrast specimen with 0.17 mm cover slip on the mechanical stage 75x30 R (3-3/**8**).
- Swing 10x objective into beam path via knurled ring (3-3/**9**) of the nosepiece.
- Look throught the fixed eyepiece of the binocular tube (3-3/**1**) first and focus on the object via the focusing drive (3-3/**2**).

  Then set the focus for the other eye by turning the eyelens of the focusing eyepiece.
- The eyepiece distance is matched to the individual interpupillary distance by swinging the eyepiece tubes symmetrically towards one another.

  Set the interpupillary distance in such a way that you can see a sharply limited field of view with both eyes.
- The viewing height can be increased (3-4/**A**) or reduced (3-4/**B**) by turning the entire binocular tube through 180°.

The KÖHLER illumination principle requires the following settings of the condenser, the luminous-field diaphragm and the aperture diaphragm:

- Move condenser 0.9 Z (3-3/**6**) to the upper stop position via the condenser drive, swing condenser front lens 0.9 into the optical beam path and move aperture diaphragm in the center position via lever (3-3/**5**).
- Set (reduce) diameter of the luminous-field diaphragm (3-3/**3**) until it is visible in the field of view (3-5/**A**). Focus the edge of the luminous-field diaphragm by slightly lowering the condenser (color-free edge) (3-5/**B**) and center the image of the luminous-field diaphragm using the two condenser centering screws (3-3/**7**) (3-5/**C**).

  Open the luminous-field diaphragm (3-3/**3**) until it just disappears behind the edge of the field of view (3-5/**D**).

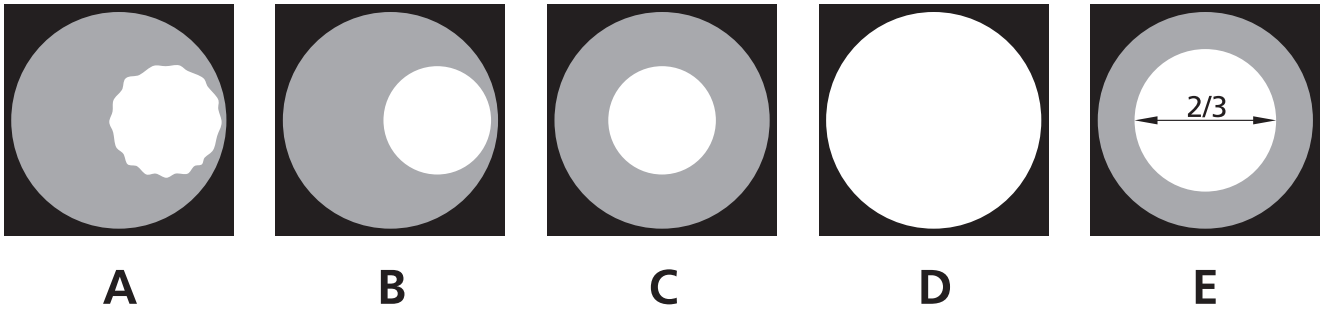


Fig. 3-5 Setting of diaphragm images according to KÖHLER

- Depending on which specimen is used, the image contrast can be adjusted via the aperture diaphragm (3-3/**5**). For specimens featuring normal contrast, the aperture diaphragm (3-3/**5**) should be set to approx. 2/3 of the diameter of the exit pupil of the objective.

  This can be easily checked and set when the eyepiece is removed (3-5/**E**).
- Finally, refocus the specimen via the coaxial fine drive (3-3/**2**).

Since field size and objective aperture change after every objective change, the setting of the luminous-field diaphragm and the aperture diaphragm must be repeated as described above.
For all objective magnifications $V_{obj} < 10x$, the condenser front lens 0.9 must be swung out of the beam path.

3.3 Setting of transmitted-light phase contrast

The phase contrast technique is mainly used to increase the image contrast of unstained specimens.

As described in chapter 2, the microscope is ready for operation and switched on according to section 3.1.

The microscope must be set for transmitted-light brightfield, as described in section 3.2.

The further steps depend on whether phase contrast equipment A or B is used.

Optimum phase contrast requires a high level of cleanliness! Therefore, clean the front lens of the objective used, the visible condenser surfaces, the upper cover slip surface and the lower carrier plate surface of the specimen with particular care and carefully remove grease.

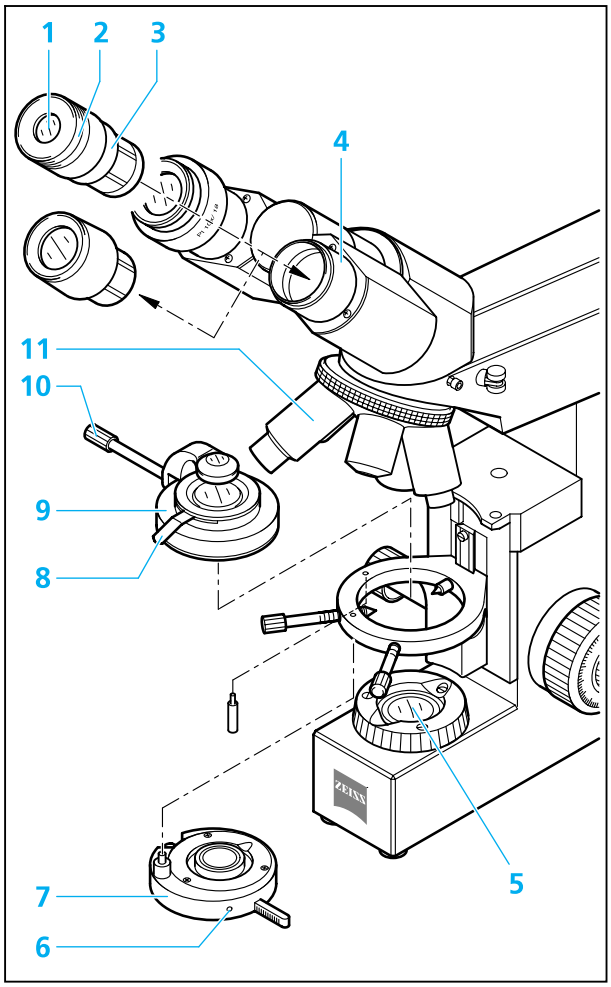


Fig. 3-6 **Setting of phase contrast using condenser 0.9 Z**

Equipment A

- condenser 0.9 Z (3-6/**9**) and Ph 2 phase stop carrier (3-6/**7**)
- phase contrast objectives labelled "Ph 2" (3-6/**11**), suitable also for transmitted-light brightfield

Settings:

- Place unstained specimen on the mechanical stage:
- Screw phase-contrast objective, e.g. 40x/0.65 Ph 2 (3-6/**11**), into nosepiece and swing it into the beam path.
- Remove condenser front lens 0.9 from the beam path via lever (3-6/**10**).
- Open the luminous-field diaphragm (3-6/**5**) and the condenser aperture diaphragm (3-6/**8**).
- Swing in phase stop carrier (3-6/**7**) with Ph 2 phase stop.
- Set the required brightness.
- Check whether phase stop centering complies with figure (3-7/B). For this, remove one eyepiece and replace it with the diopter or a centering telescope (3-6/**3**).
- If required, center the phase stop via the two centering screws (3-6/**6**) using the SW 1.5 screwdriver. The diopter or the centering telescope (3-6/**3**) must then be replaced with the eyepiece again.

Complete phase contrast is available only if the dark phase ring in the objective covers the bright phase stop in the condenser completely and precisely (also see Fig. 3-7/**B**).

To achieve this, the diopter or the centering telescope (3-6/**3**) must be inserted in tube (3-6/**4**) instead of an eyepiece. Focus on the phase ring by turning the eyelens (3-6/**1**) of the centering telescope via the knurled ring (3-6/**2**).

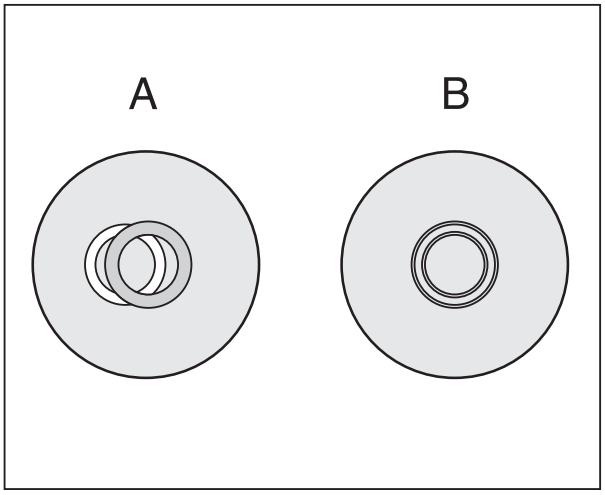


Fig. 3-7 **Centering of phase stops in phase contrast**

Equipment B

- phase contrast condenser II Z 0.9 Ph1, 2, 3 (3-8/**1**)
- phase contrast objectives labelled "Ph 2" (3-6/**11**), suitable also for transmitted-light brightfield

Settings:

- Insert phase contrast condenser II Z 0.9 Ph 1, 2, 3 (3-8/**1**) in the condenser carrier as described in section 2.
- Screw phase contrast objective (3-6/**11**) into the nosepiece and swing it into the optical beam path.
- Set the object in brightfield first by having the turret disk (3-8/**5**) click-stop in position "J".
- Swing in the condenser front lens (3-8/**2**) via lever (3-8/**4**).
- Reduce luminous-field diaphragm (3-6/**5**), focus it using the condenser, center it and open it again (as described in section 3.2, page3-5).

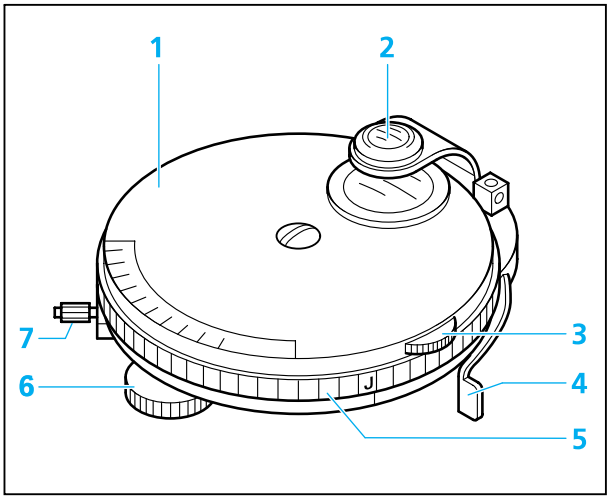


Fig. 3-8 **Setting of phase contrast using Ph condenser II Z 0.9**

- Optimum image contrast in brightfield is obtained by setting the aperture diaphragm via setting wheel (3-8/**3**). The aperture diaphragm can be centered using knurled wheel (3-8/**6**) and fixed using lever (3-8/**7**) which can be clamped in position.
- Swing phase stop Ph 1, 2 or 3 assigned to the phase contrast objective in the beam path via turret disk (3-8/**5**).
- Check centering of both phase stops using the centering telescope (3-6/**3**) in the tube, as described above.
- If the phase rings are out of center, as shown in Fig. (3-7/**A**), use knurled wheel (3-8/**6**) to make the bright phase stops in the condenser exactly congruent with the dark phase ring in the objective, as shown in Fig. (3-7/**B**).

3.4 Setting of transmitted-light darkfield

Darkfield is mainly used for small or minute objects such as treponema, spirochaeta, cilia and bacteria, but also for emulsions or unstained objects in watery solutions.

The special benefit of the darkfield technique is its natural, true rendition of the original colors (color fidelity).

The equipment required for darkfield always includes a condenser with central stop, the numerical aperture of which exceeds that of the objective used. For further details please see the following table.

Condenser with illumination aperture	**suitable objective apertures**
Ph condenser II Z 0.9 in position Ph 3≥ 0.44 Ph condenser II Z 0.9 in position D 0.6/0.9)	≤ 0.4 0.4 -0.55
dry darkfield condenser 0.7 - 0.85 on condenser holder Z	0.4 - 0.6
dry darkfield condenser 0.8 - 0.95 on condenser holder Z	0.6 - 0.75
Ultracondenser 1.2 - 1.4 on condenser holder Z	0.75 - 1.0

Higher objective magnifications or apertures require objectives with an integrated iris aperture.

As described in chapter 2, the microscope is ready for operation and switched on according to section 3.1.

The microscope must be set for transmitted-light brightfield, as described in section 3.2.

Settings:

- Correct condenser height until image background appears in optimum darkness.
- Checking the objective pupil reveals whether it is dark indeed; for this purpose, remove the eyepiece from the tube and view the objective exit pupil.
- Setting of darkfield is made easier by performing precentration using an objective of a lower power. Since the luminous field is visible only where particles light up, while the final specimen, however, might be "empty" over large areas, we would recommend you to use a specimen for initial setting which features a homogeneous distribution of details, e.g. a blood smear.

Darkfield microscopy requires specimens and optical surfaces to be extremely clean. Finger prints and traces of grease in particular have negative effects, since they brighten the background of the field of view.

3.5 Setting of transmitted-light polarization contrast

As described in chapter 2, the microscope is ready for operation and switched on according to section 3.1.

Transmitted-light polarization contrast requires the following equipment:

- polarizer, oriented in EAST-WEST direction, (453615) (3-9/**3**), mounted on swing-out carrier.
- analyzer (3-9/**1**), oriented in NORTH-SOUTH direction, and lambda plate (3-9/**2**) are mounted on two separate sliders (453692) and integrated into the stand head. To enable the function to be performed, the sliders must be pushed in.

Settings:

- First, set a suitable object in brightfield as described in section 3.2.
- Swing the polarizer (3-9/**3**) in the beam path.
- If **only** the analyzer slider (3-9/**1**) is pushed in, black-and-white polarization contrast is produced; the **additional** insertion of the lambda plate (3-9/**2**) makes the objects appear in colored polarization contrast.

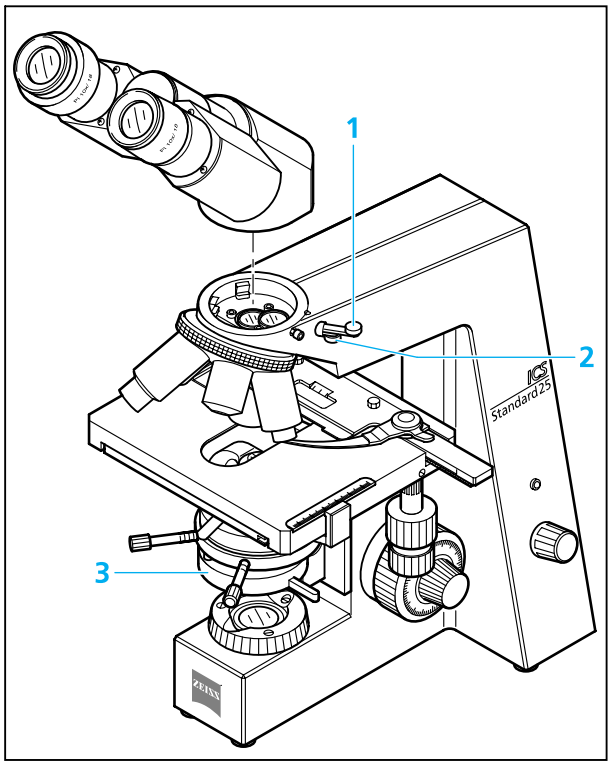


Fig. 3-9 Setting of polarization contrast

The sliders containing the analyzer and the lambda plate must always be pushed in until stop to make them fully effective and to avoid the field if view to be cut off.

Retrofitting of the polarization equipment can be performed by the Zeiss service agency (see section 4.4).

3.6 Measurement of lengths

The measurement of lengths using the Standard 25 ICS requires the following, for example:

- stage micrometer, positive 5 + 100/100 y D = 0.17 mm

  and
- eyepiece crossline micrometer 10:100, d = 26 mm

An overview of available stage micrometers and eyepiece reticles is given in chapter 1.6.

Before the length measurement using the microscope can be performed, the micrometer or scale value of the used objective / eyepiece reticle combination must be determined. This scale value is exactly that distance in the specimen which complies to one interval of the used eyepiece crossline micrometer.

For calibration, align the scales of the stage micrometer and the crossline micrometer parallel to each other by turning the eyepiece, and make the zero lines of both scales exactly congruent. If, for example, 99 increments (of 20 µm each) of the stage micrometer correspond to exactly 100 increments of the crossline micrometer, as in Fig. 3-10, the resulting scale value k' for the used objective / eyepiece reticle combination (A-Plan 10x/0.25 and crossline micrometer 10:100) is

$$k' = \frac{99}{100} \times 10\ \mu m = 9.9\ \mu m$$

The distance to be measured should be ≥ 5 mm in the intermediate eyepiece image in order to keep the influence of random measuring deviations as low as possible.
Other measuring errors may occur if the eyepiece has not been inserted into the tube until stop.

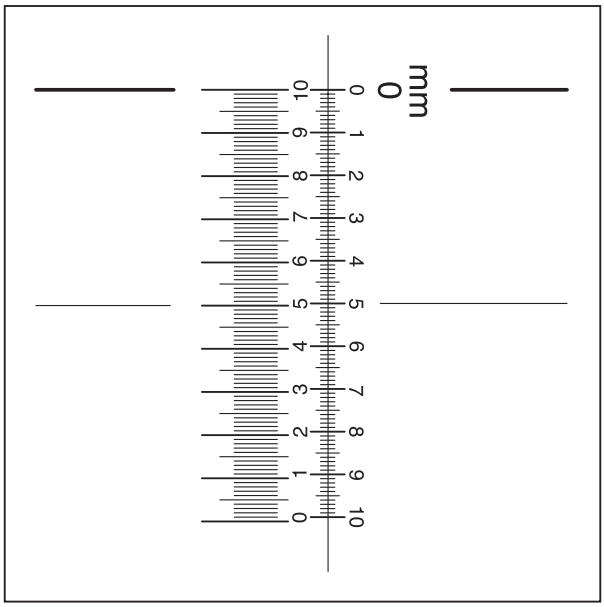


Fig. 3-10 Measurement of lengths

After exchange of the stage micrometer for the specimen to be measured, the measuring distance of interest results from the number of increments of the eyepiece crossline micrometer (tenth estimated) multiplied by the scale value k'. Example:

L = 35.5 x 9.9 mm = 351.5 µm

Particularly large object structures can also be determined by using the vernier scale gradations (0.1 mm) on the mechanical stage. Here, it might be necessary to determine the distance to be measured through calculation from a combined x and y measurement (Pythagoras).

3.7 Attachment of photomicrography equipment

The Standard 25 ICS microscope with camera tube can be changed from observation to photography via a pushrod (3-11/**7** or 3-12/**8**) (pushrod pulled out for photomicrography). Special adapters allow commercially available 35 mm SLR cameras and special microscope cameras (e.g. MC 80 DX) to be attached to the camera port of the Standard 25 ICS. For the use of the photomicrography equipment, please observe the relevant separate manuals in addition to the information provided in this manual.

3.7.1 Attachment of SLR camera, e.g. CONTAX 167 MT

- Screw T-2 adapter for the CONTAX bayonet (3-11/**3**) on the 2.5x connector for T2 (3-11/**4**) (456005).
- Attach the camera housing (3-11/**2**) and fix the cable release (3-11/**1**), if required.
- Loosen the three hexagonal screws (3-11/**6**), remove the dust cover (3-11/**8**) from the camera tube (3-11/**5**) and insert the premounted unit **A** in the camera tube.
- Align the camera unit in the required position and tighten the three hexagonal screws (3-8/**6**).
- Pull out pushrod (3-11/**7**) completely for photomicrography.
- When artificial light color reversal film is used, the CB 3 conversion filter provides the correct color temperature of 3200 K. The filter must be placed on the dust protection glass of the luminous-field diaphragm (3-2/**5**), as mentioned in section 3.1.
- For daylight color reversal film, the CB 12 conversion filter must be used in addition to the CB 3 conversion filter.

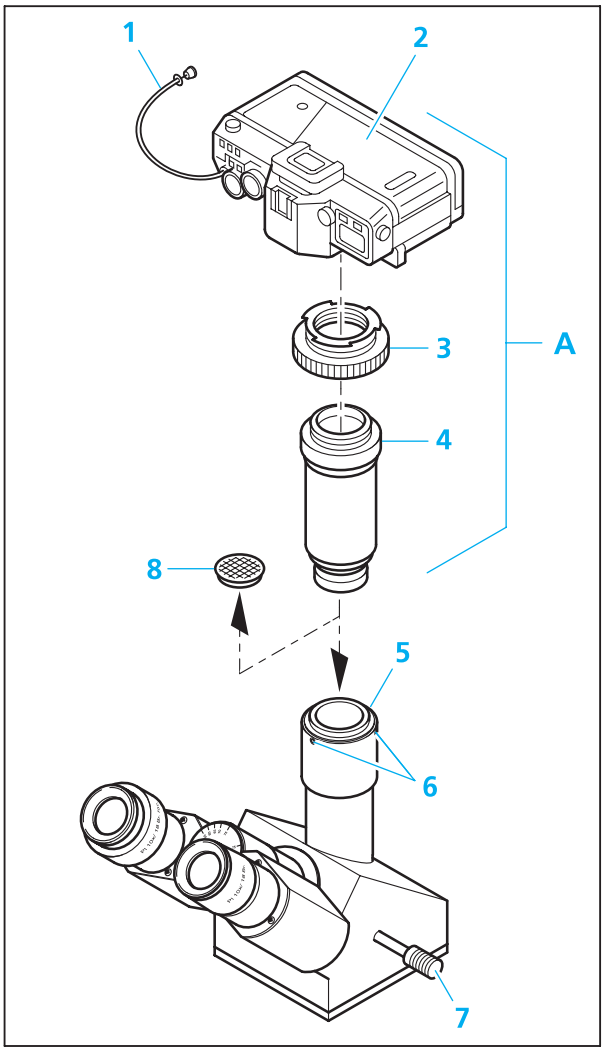


Fig. 3-11 **Attachment of SLR camera, e.g. CONTAX 167 MT**

If focusing is not to be made via the viewfinder of the camera, the component with the eyepiece reticle must be screwed in the eyepieces (also see section 1.6).

Various T2 adapters for SLR cameras are listed below:

T2 adapters to SLR cameras	**Cat. No.**
T2 adapter for CONTAX (CONTAX bayonet)	416010
T2 adapter for OLYMPUS OM (OM bayonet)	416002
T2 adapter for MINOLTA (SR bayonet)	416003
T2 adapter for CANON (FD bayonet)	416004
T2 adapter for NIKON (F bayonet)	416009
T2 adapter for PENTAX (KA bayonet)	416011

For detailed information on SLR cameras please see manual G 42-406/II entitled "35 mm SLR cameras for microscopes and stereomicroscopes".

3.7.2 Attachment of MC 80 DX microscope camera (35 mm film cassette)

- Insert adapter 60 for microscope camera (3-12/**5**) (456006) in camera tube (3-12/**6**) and fix it using three hexagonal screws (3-12/**7**).
- Insert projection lens P 2.5x (3-12/**4**) in adapter 60 for microscope camera (3-12/**5**).
- Attach MC 80 DX basic body (3-12/**2**) on adapter 60 for microscope cameras until stop and fix it by clamping ring (3-12/**3**) anticlockwise.
- Attach 35 mm film cassette Mot DX (3-12/**1**) to the basic body in such a way that the contact pins firmly engage in the relevant sockets.
- Pull out pushrod (3-12/**8**) completely for photomicrography.
- When artificial light color reversal film is used, the CB 3 conversion filter provides the correct color temperature of 3200 K. The filter must be placed on the dust protection glass of the luminous-field diaphragm (3-2/**5**), as mentioned in section 3.1.
- For daylight color reversal film, the CB 12 conversion filter must also be used. The filter must be placed on the dust cover of the luminous-field diaphragm (3-2/**5**), as described in section 3.1.

For detailed information on the MC 80 DX, please see manual B 40-036-e.

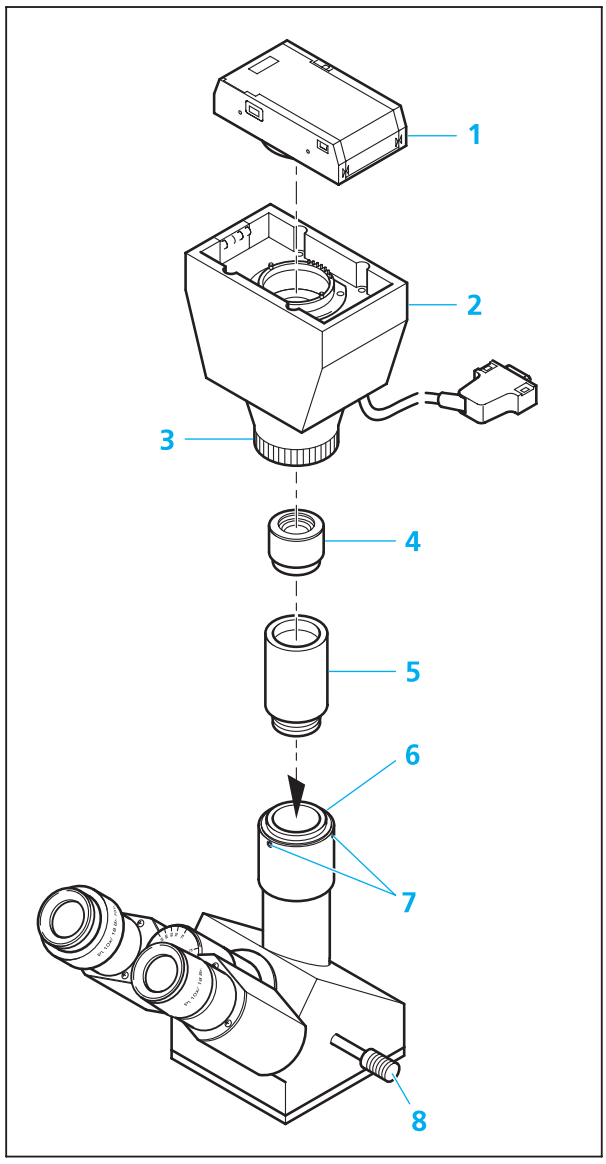
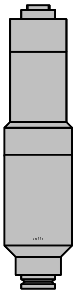
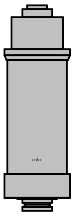
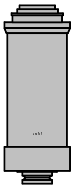
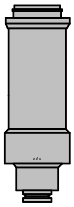
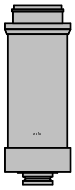
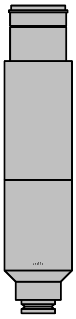


Fig. 3-12 Attachment of MC 80 DX microscope camera

3.8 Attachment of adapters for video cameras

The following video adapters and video zoom adapters with 60 mm interface permit the attachment of one-chip b/w and color CCD cameras and three-chip color CCD cameras to the camera tube of the Standard 25 ICS.

Tube	Adapter Cameras	
Standard 25 ICS Camera Tube with 60 mm Interface		
	456105 60 C 2/3“ 1.0x	**456107** 60 C 2/3“ 0.63x
	456106 60 C 1/2“ 0.5x	
	 **456119** 60 C 1/3“ (3CCD) 0.5x	**456108** 60 C 1/3“ 0.4x
	 **456123** Zoom 60 C 2/3“ 0.4x ... 2x	
Cameras with C-Mount		
	456115 60 ENG 2/3“ 1.0x	**456117** 60 ENG 2/3“ 0.8x
	 **456121** Zoom 60 ENG 2/3“ 0.4x ... 2x	
3-Chip Cameras with 2/3“ Bayonet		
	 **456124** Zoom 60 ENG 1/2“ 0.5x ... 2.4x	 **456122** Zoom 60 ENG 1/2“ 0.4x ... 2x
	 **456118** 60 ENG 1/2“ 0.63x	
3-Chip Cameras with 1/2“ Bayonet		

The connecting piece 60 - 44 also allows video adapters with 44 mm interface to be used with the camera tube of the Standard 25 ICS with 60 mm interface.

Video adapters (Cat.No.)	Suitable for::	Comments
456140 Connecting piece 60 - 44	Microscopes with 60 mm interface and all video adapters for 44 mm interface.	Connects video adapters for 44mm interface to microscopes with 60 mm interface.

Attachment of video cameras:

- Loosen three hexagonal screws and remove dust cover from the camera tube of the Standard 25 ICS.
- Screw video adapter or video zoom adapter with C-mount thread into the video camera.

  Insert video adapter or video zoom adapter in ENG 2/2" or ENG ½“ bayonet of the video camera and clamp it tight.
- Insert premounted unit (video camera with video adapter or video zoom adapter) in camera tube of the Standard 25 ICS, align it and fix it using the three hexagonal screws.
- Insert eyepiece with photo reticle in the binocular tube and align photo reticle parallel to the camera.
- Pull out pushrod on the binocular phototube to direct 50% of the light to the camera port.
- Set the required zoom magnification factor via the wheel of the video zoom adapter.
- If required, adjust image brightness on the monitor by changing the lamp brightness on the microscope stand.

The instructions of the camera manufacturer must also be observed when operating the video camera.

3.9 Insertion of 8x drawing eyepiece

The 8x drawing eyepiece (444126) is an accessory for microscopic drawing and can only be used in combination with the binocular phototube 35°/20[1] CS on the Standard 25 ICS. The eyepiece contains a beam splitter which allows the simultaneous observation of the microscope image and the drawing area.

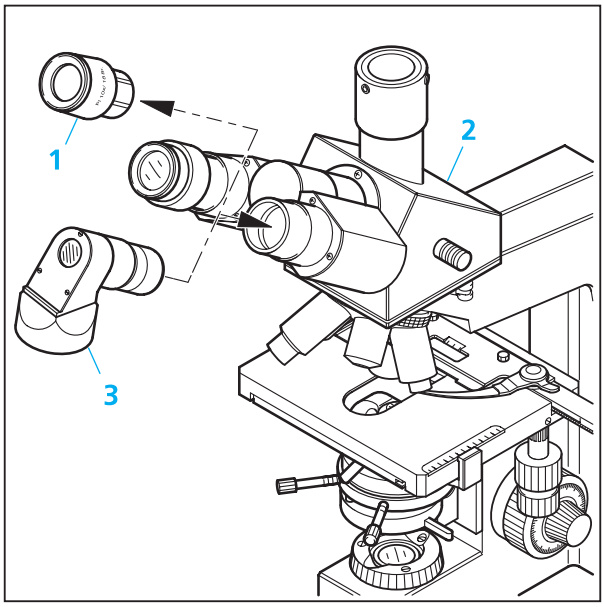


Fig. 3-13 Insertion of 8x drawing eyepiece

As described in chapter 2, the microscope is ready for operation and switched on according to section 3.1.

The microscope must be set for transmitted-light brightfield, as described in section 3.2.

Settings:

- Remove one eyepiece (3-13/**1**) and insert the 8x drawing eyepiece (3-13/**3**) in the binocular phototube 35°/20 ICS (3-13/**2**) instead of it. Swing 8x drawing eyepiece until the drawing area (DIN A4 notepad) lying in front of the stand appears symmetrically aligned also in the field of view.
- Screw on the drawing eyepiece.
- Illuminate the drawing area in such a way that it can be seen in the same quality as the microscope image. If required, reduce the brightness of the microscope image via the brightness control (3-1/**1**).
- A special drawing pencil is supplied to facilitate drawing.

[1] 35°/20 means a viewing angle of 35° and the maximum field number 20.

CARE, MAINTENANCE AND TROUBLESHOOTING

Contents

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4 CARE, MAINTENANCE AND TROUBLESHOOTING

4.1 Care and maintenance of the instrument

Maintenance of the Standard 25 ICS is limited to the following operations:

- Cover the instrument with the dust cover after every use.
- Do not set up the instrument in a damp room, i.e. max. humidity < 85%.
- Remove dust from optical surfaces using a rubber blower or a natural hair brush. Use alcohol to remove grease from brush, then dry the brush. Remove stubborn dirt and fingerprints using a dust-free cloth or leather cloth.
- Remove stubborn dirt (e.g. fingerprints) from optical surfaces using commercially available optics cleaning cloths; if necessary, slightly moisten the cloths with petroleum ether. Clean the front lenses of the objectives using petroleum ether, but do not use alcohol.

When using the Standard 25 ICS in humid climatic zones, proceed as follows:

- Store the Standard 25 ICS in bright, dry and well ventilated rooms with a humidity of less than 85%; store particularly sensitive components and accessories, such as objectives and eyepieces, in a dry closet.
- When the equipment is stored in closed cases for a longer period of time, the growth of fungus can be avoided by including cloths soaked in fungicide in the cases.

The risk of growth of fungus on opto-mechanical instruments always exists in the following conditions:

- relative humidity of more than 75% and temperatures between +15° C and +35° C for more than three days.
- installation in dark rooms without air ventilation, and
- dust deposits and fingerprints on optical surfaces.

4.2 Troubleshooting

Troubleshooting is described in further detail using the following two examples:

- changing the fuses, and
- changing the 6 V / 20 W halogen lamp.

Further measures are summarized under 4.2.3.

4.2.1 Changing the fuses

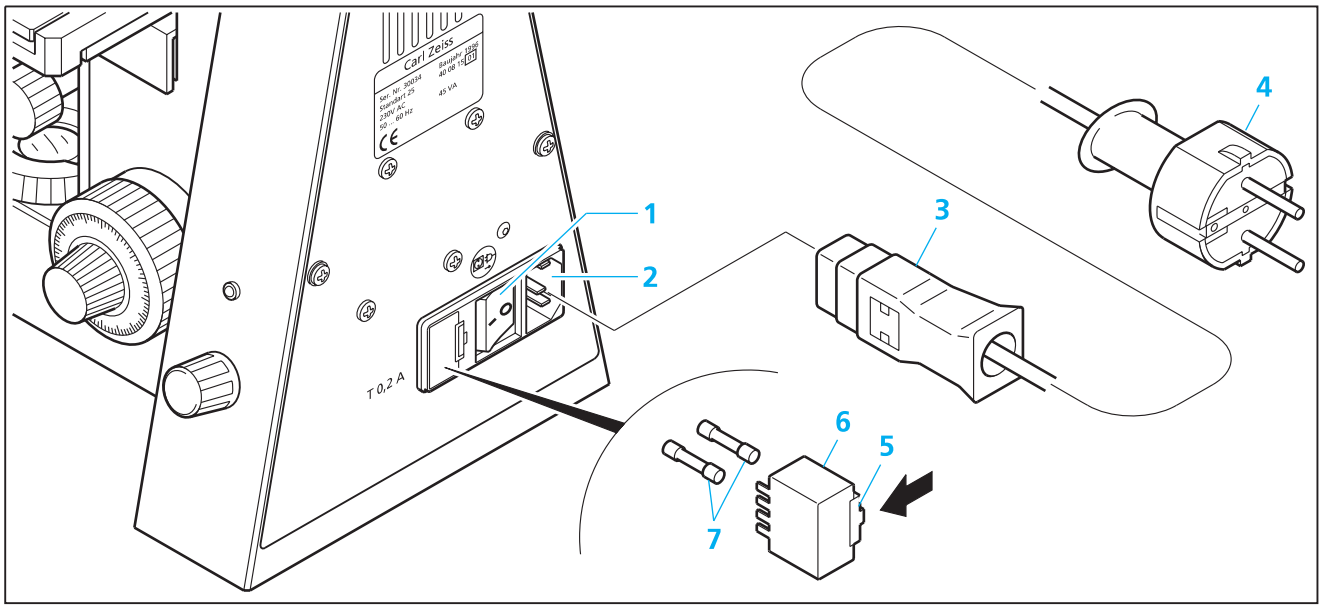

Fig. 4-1 Changing the fuses

- Switch off the instrument via the on/off switch (4-1/**1**) and disconnect earth-contact plug (4-1/**4**) from the line; if required, also disconnet flat plug (4-1/**3**) from the instrument connector (4-1/**2**).
- Check line cable and instrument plugs (4-1/**3** and **4**) and exchange them, if required.
- Press marked lock (4-1/**5**) in the direction of the arrow and remove fuse holder (4-1/**6**). Check fuse inserts (4-1/**7**) for compliance with the line voltage and check whether resistance wires are OK.

  for 230 V: T 0.2 A; 250 V

  for 115 V: T 0.4 A; 250 V

  Be absolutely sure that you replace defective fuse inserts. For the catalogue numbers of spare fuses please see page 4-10 in section 4.3.

4.2.2 Changing the 6 V 20 W halogen lamp

The following procedure is required to exchange the lamp:

- Switch off lamp supply via on/off switch (4-1/**2**) and allow lamp to cool down for approx. 15 minutes.
- Disconnect the earth-contact plug (4-1/**4**) from the line and remove the flat plug (4-1/**3**) from the instrument connector (4-1/**2**).
- Disconnect the instrument from the line and place it on the back to make the underside of the pyramid stand accessible.
- Fold down cover (4-2/**2**) and pull out defective halogen lamp (4-2/**1**).
- Use the protective film or a clean paper cloth to hold the new 6 V 20 W halogen lamp and insert both lamp pins carefully into the receptacles.

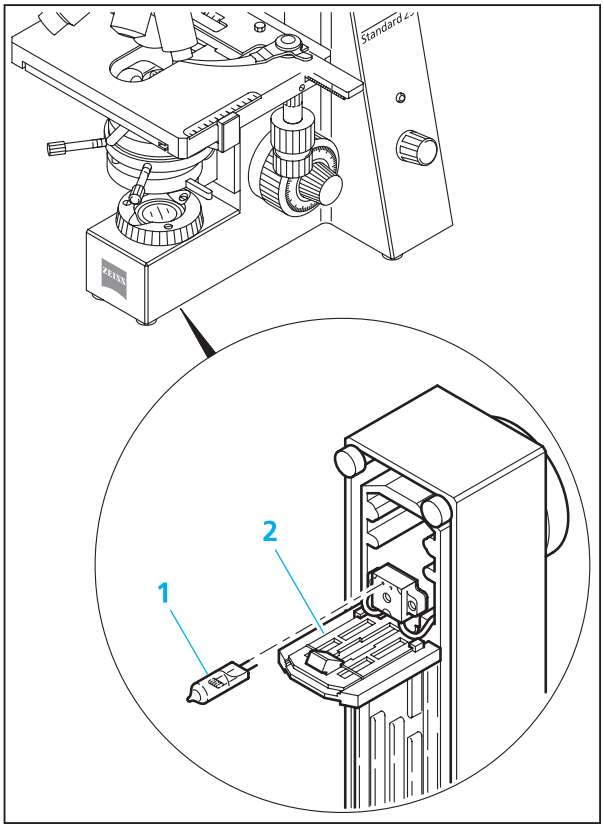

Fig. 4-2 Changing the 6 V 20 W halogen lamp

Do not touch the lamp bulb with your bare hands; if required, clean the bulb with clean alcohol **before** switching it on for the first time in order to avoid dirt to burn in.

The Standard 25 ICS is supplied with factory-aligned illumination. The illumination need not be adjusted even when the lamp is exchanged by the customers themselves.

- Fold up cover again, turn the stand upside again and connect the stand to the line.

4.2.3 Troubleshooting table

Problem	Cause	Remedy
vignetting or unhomogeneous image brightness in the field of view the field of view is not entirely visible	The pushrod on the camera tube is not in the correct position (observation/photography)	Move the pushrod in the correct position (end position), see pages 3-11 and 3-13.
	Nosepiece with objective not switched to stop position	Switch nosepiece with objective in stop position
	Condenser not set correctly.	Set condenser correctly (adjustment, centering), see pages 3-4, 3-5
	Aperture diaphragm not set correctly.	Set aperture diaphragm correctly (centering, opening), see page 3-5.
	Luminous-field diaphragm not set correctly.	Set luminous-field diaphragm correctly (centering, opening), see page 3-5.
	Filter not inserted correctly in filter mount.	Insert filter correctly in filter mount, see page 3-3.

Problem	Cause	Remedy
Low resolving power and poor image contrast	Aperture diaphragm opening not set correctly.	Set aperture diaphragm opening in accordance with the 2/3 rule or depending on the specimen features, see page 3-5.
	Condenser not focused correctly and condenser lens 0.9 not switched correctly.	Focus condenser and set condenser lens 0.9 correctly or switch it off, see pages 3-4, 3-5.
	Wrong cover slip thickness for 0.17 transmitted light objectives	Use the correct 0.17 mm cover slips
	Use of no or unspecified immersion oil with CZ immersion objectives	Use CZ immersion oil 518 N, see page 4-10.
	Air bubbles in the immersion oil	Apply oil again to remove the bubbles.
	Immersion oil at the front lens of a dry objective	Clean the front lens of the dry objective, see page 4-3.
	Corr. Ring is not set to the correct cover slip thickness	Set the corr. ring to the correct thickness, see page 1-6.
	Dirt or dust on the optical surfaces of objectives, eyepieces, condensers or filters	Clean the appropriate components, see page 4-3
Image aberration	Condenser not set correctly.	Set condenser correctly, see pages 3-4, 3-5
	Nosepiece not correctly switched to stop position	Correctly click-stop nosepiece
	Specimen is not fixed on the mechanical stage	Correctly set specimen in specimen holder and fix it.
Great focus differences after objective change	Focusing eyepieces are not set correctly.	Set focusing eyepieces to the appropriate ametropia, s. page 2-5

Problem	Cause	Remedy
Left and right fields of view cannot be combined into an image	Interpupillary distance of the binocular tube is not set correctly.	Set interpupillary distance correctly, see pages 2-5, 3-4
	Focusing eyepieces are not set correctly.	Set focusing eyepieces to the appropriate ametropia, s. page 2-5
Eye-fatiguing microscopy	Interpupillary distance of the binocular tube is not set correctly.	Set correct interpupillary distance, see pages 2-5 and 3-4.
	Focusing eyepieces are not set correctly.	Set focusing eyepieces to the appropriate ametropia, s. page 2-5
	Image brightness not acceptable	Reduce lamp voltage or insert conversion filter
Dirt or dust in the field of view	Condenser not focused correctly and condenser lens 0.9 not switched correctly.	Focus condenser and set condenser lens 0.9 correctly or switch it off, see pages 3-4, 3-5.
	Aperture diaphragm opening too small	Set aperture diaphragm opening in accordance with the 2/3 rule or depending on the specimen features, see page 3-5.
	Dirt or dust on the optical surfaces of objectives, eyepieces, condensers, filters or specimens	Clean the optical surfaces of the appropriate components, see page 4-3
The 6 V 20 W halogen lamp does not function although the on/off switch is in "on" position	Line cable not connected to the line.	Connect line cable to the line and make sure to check the instrument and line voltage, see page 2-6.
	6 V 20 W halogen lamp not installed	Install 6 V 20 W halogen lamp, see page 4-5
	6 V 20 W halogen lamp defective	Exchange 6 V 20 W halogen lamp, see page 4-5
	The specified 6 V 20 W halogen lamp is not used.	Use the specified 6 V 20 W halogen lamp, see page 4-10.
	Defective fuses	Exchange fuses, see page 4-4.
	Electronics module possibly defective	Have electronics module checked by service and replaced, if required (see page 4-11)

Problem	Cause	Remedy
The 6 V 20 W halogen lamp flickers, unstable brightness	End of average life of 6 V 20 W halogen lamp	Replace 6 V 20 W halogen lamp, see page 4-5
	Incorrectly installed or broken line cable	Correctly connect line cable or replace it, see page 4-4
	The pins of the 6 V 20 W halogen lamp are not correctly inserted into the receptacle	Corectly insert pins of 6 V 20 W halogen lamp in receptacle, see page 4-5

4.3 Table of spares, consumables and tools

Description	Cat. No.	Application
6 V 20 W long-life halogen lamp	380079 9690.000	for the integrated Standard 25 ICS illumination
SW 3 ball-headed screwdriver	000000 0069.551	to change the tubes
Eyepiece eyecup	444801 0000.00	recommended for techniques with a low brightness level in order to suppress light reflection
Dust cover for nosepiece Dust cover for eyepiece tube	462981 0000.000 000000 0168.373	to cover unused instrument openings
Immersion oil 518 N ; 20 ml oiler 100 ml bottle 250 ml bottle 500 ml bottle	 444950 0000.000 444952 0000.000 444953 0000.000 444954 0000.000	for applications using immersion oil
Cleaning paper, 300 sheet	462975 0000.000	to clean optical surfaces
G-fuse inserts (5 x 20 mm) ; for 230 V; T 0.2 A; 250 V for 115 V; T 0.4 A; 250 V	 000000 0127.013 000000 0127.016	 electrical overload protection for the integrated power supply
Light filters; interference wide-band filter, green, d=32x4 Interference band filter, green 546, d=32x3 CB 12 conversion filter, d=32x2 CB 6 conversion filter, d=32x2 CB 3 conversion filter, d=32x2 3200-5500 K conversion filter, d=32x2 N 0.25 neutral-density filter; d=32x2 N 0.06 neutral-density filter; d=32x2 0.50 gray filter, d = 32x4 0.12 gray filter, d = 32x4 0.03 gray filter, d = 32x4 KG 1 heat-protection filter, d = 32x2 Reflection heat protection filter, d=32x2	 467803 467807 467850 9901 467851 467852 467847 467849 467848 467840 467841 467842 467830 467832	 to enhance the contrast in b/w photography and phase contrast; for color photography using daylight color films and artificial light color reversal films for observation and b/w photography with transmission information in % for photography without color distortion, with transmission information in % to protect sensitive specimens from heat
Dust cover K Dust cover G (only in combination with binoclar phototube)	459300 0000.000 459306 0000.000	to cover the instrument when it is not used.

4.4 Requesting service

All repairs of mechanical, optical or electronic components inside the instrument and of the electrical components of the Standard 25 ICS may only be performed by Carl Zeiss service staff or specially **authorized** personnel.

To ensure the optimum setting and trouble-free function of your microscope even for a longer period of time, we would recommend you to conclude a service/maintenance contract with Carl Zeiss.

In the case of subsequent orders or when service is required, please get in touch with your local Zeiss agency.

ANNEX

- List of abbreviations A-3
- Physical and technical units..... A-4
- Certification in accordance with DIN EN ISO 9001 / DIN EN 46001..... A-5
- EC conformity declaration A-7

List of abbreviations

AC	Alternating Current
AS	aspheric
A-Plan	achromatic objectives featuring improved image flatness (ICS line)
Br.	suitable for eyeglass wearers
CB	Correction Blue (conversion filter)
CCD	Charge Coupled Device
CP-Achromat	achromatic objective (ICS line)
CSA	Canadian Standards Association
d	diameter
D	darkfield, or cover slip thickness
DC	Direct Current
DIN	Deutsches Institut für Normung (German standards association)
doc	documentation
DX	coding system for the storage of electronically legible information, e.g. film speed
EG	European Community
EMV	electromagnetic compatibility
EN	European standards
ENG	Electronic News Gathering
E-PL	name of eyepiece type with aspheric lens and flat field of view
EWG	European Economic Community
FAA	free working distance
foc.	focusing
HAL	halogen lamp
H	brightfield
ICS	Infinity Color-corrected System
IEC	International Electrotechnical Commission
IP	International Protection (protection type)
ISO	International Standard Organization
J	iris diaphragm on Ph condenser II Z 0.9
KG 1	heat-protection glass from Schott
L	left (drive control on the left of the mechanical stage)
LED	Light Emitting Diode
LD	Long Distance
MC	Microscope Camera
N	neutral-density filter

PCB	polychlorinated biphenyl
Ph	phase contrast
Pl	flatfield
R	right (control on the right of the mechanical stage)
SLR	Single Lens Reflex
SK	protection class
SW	wrench opening
s/w	black-and-white
T	slow-blow (fuse type)
TV	television
T2-Adapter	standard adapter for 35 mm cameras
UL	Underwriters Laboratories (US test authority)
V_{Obj}	magnification of the objective
VDE	association of German electrotechnicians
vis	visual
W 0,8"	Whitworth-type thread (inch thread) 0.8"
Z	centering

Physical and technical units

A	ampere
°	angular degree
°C	Centigrade
h	hour
Hz	Hertz
K	Kelvin
kg	kilogram
lm	Lumen (light flux)
mm	millimeter
U	rotations
V	Volt
W	Watt